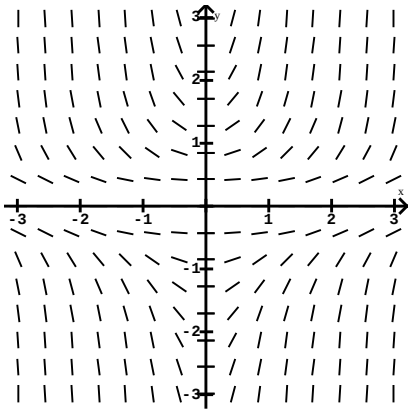
AP Calculus BC **Name** _____

Homework - Slopefields and Euler's Method

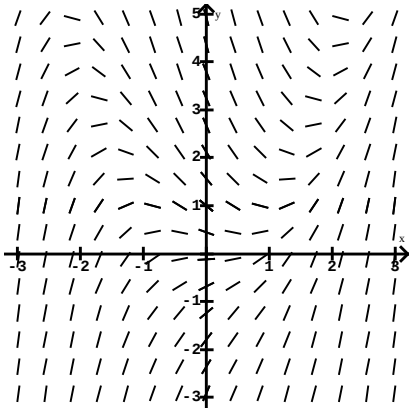
Sketch all solution graphs on the given slopefield graphs and put <u>all other work</u> on engineer's paper.

1. The figure shows the slopefield for $y' = x \bullet y^2$



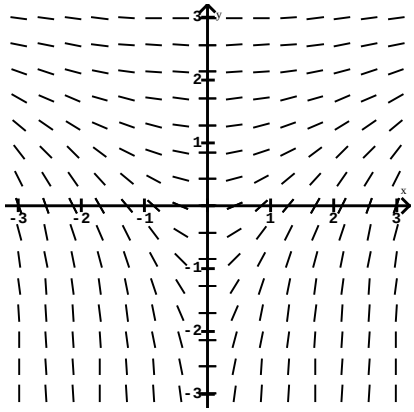
   a. Sketch the solutions with initial conditions $y(0) = 1$ and $y(0) = -1$.
   b. Find the general solution to the differential equation by hand, and use desolve() on your calculator to check your solution. Then find the particular solutions for the initial conditions in part a.
   c. Use Euler's method with a time step of $h = 0.2$ to approximate $y(0.2)$, $y(0.4)$, $y(0.6)$, $y(0.8)$, and $y(1.0)$, given $y(0) = -1$. Compare these values with the actual values from the appropriate equation you found in part b.
   d. Is $y(x) = 0$ a solution to this DE?

2. The figure shows the slopefield for $y' = x^2 - y$



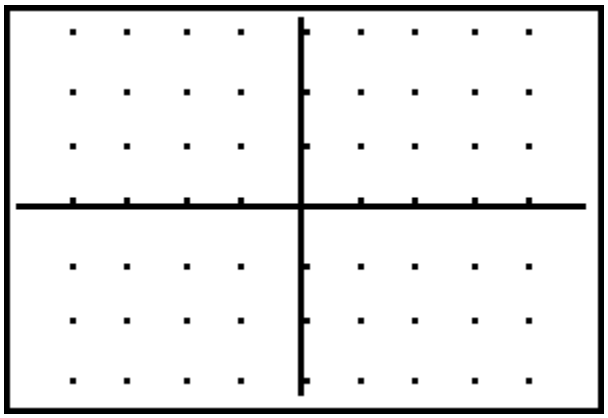
   a. Sketch the solutions with initial conditions $y(0) = 1$, $y(1) = 0$ and $y(2) = 3$.
   b. Use desolve() on your calculator to help find the equations of these solutions. (It can't be solved by separation of variables, so just use the calculator).
   c. Use Euler's method with a time step of $h = 0.1$ to approximate $y(2.1)$, $y(2.2)$, $y(2.3)$, $y(2.4)$, and $y(2.5)$, given $y(2) = 3$. Compare these values with the actual values from the appropriate equation you found in part b.
   d. Is $y(x) = 0$ a solution to this DE?

3. The figure shows the slopefield for $y' = x * e^{-y}$



   a. Sketch the solutions with initial conditions $y(0) = 0$, and $y(2) = 0$.
   b. Find the general solution to the differential equation by hand, and use desolve() on your calculator to check your solution. Then find the particular solutions for the initial conditions in part a.
   c. Use Euler's method with a time step of $h = -0.1$ to approximate $y(1.9)$, $y(1.8)$, $y(1.7)$, $y(1.6)$, and $y(1.5)$, given $y(2) = 0$. Compare these values with the actual values from the appropriate equation you found in part b.
   d. What are the domains of the equations that you found in part b?

4. Plot the slopefield of the differential equation $xy' - 3y = 0$ on the blank slopefield below:



Do problem 8 on page 537-538 of your textbook.